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ABSTRACT

The Profile of Real/Ideal Scholastic Motivation (PRISM) self-report instrument is included in the user's manual. PRISM is a set of 30 postulates which measures attitudes in an educational setting (i.e., educational self-theory). The instrument has a closed response format chosen on the grounds of reliability, validity, and reactivity. It is scaled using a four-point Likert scale: strongly agree, agree, disagree, and strongly disagree. PRISM has the following advantages as a measure of educational self-theory with applications for high school and college research purposes in psychology and education: (1) it is non-threatening and verbally undemanding; (2) it is easy to administer; (3) there is no necessity for extensive specialized preparation for its administration; (4) it is quickly completed in 15-20 minutes; (5) scoring is completely objective and quickly accomplished; (6) there is no time limit for completion; (7) no oral response is required, and no face-to-face situation need be involved which permits greater frankness and objectivity; (8) it may be used as a group or individual instrument; and (9) there is little or no reactivity. (RL)

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PRISM

PROFILE OF REAL/IDEAL SCHOLASTIC MOTIVATION

USER'S MANUAL

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"PERMISSION TO REPRODUCE THIS
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The PRISM has been designed as a measure of educational self-theory for application to research in educational institutions from secondary level through tertiary levels. Use of the PRISM requires no special training or supervision. Instructions for the Profile are straightforward and undemanding.

This manual was prepared by Sandra M. Joyce and Jennifer A. Thornton from reports of research conducted by the author.

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1. SCOPE AND DESIGN OF THE PROFILE

The development of a research methodology for studying the environmental impact of an education has caused many difficulties, particularly in the development of appropriate models and measures which are both meaningful and valid (Feldman and Newcomb, 1969; Miller, 1970). This has been partially the result of an absence of an adequate theoretical framework, problems involved with statistical models, and a lack of validity or meaningfulness in the definition of environments.

Rogers (1951, p. 494) has pointed out that 'the best vantage point for an understanding of behaviour is from the internal frame of reference of the individual himself'. Meaningful measures of environmental impact, then, must be individual/subjective measures. A focus on the concept of the person-created environment is called for rather than a consideration of environment as a static phenomenon.

In any educational setting, an intellectual environment exists which reflects characteristics of the educators in complex ways. Students bring to that environment their own personal characteristics and respond in a way that cannot always be itemised or observed. Other people observing the educational setting, e.g. parents, employers, etc. also have their own characteristic ways of responding to it. Each individual has a particular perceptual frame of reference relating to education. This perceptual frame of reference is reflected in characteristic orientation patterns and intellectual styles.

While many instruments exist which evoke information about intellectual styles and perceptions, few have been based upon the intention to identify internal intellectual states.

PERCEPTUAL FRAME OF REFERENCE AND INTELLECTUAL STYLE

A comprehensive definition of intellectual style and an appropriate measure allowing for the individual/subjective frame of reference described above was developed by Docking (1976).

Clark and Trow (1966) identified two variables (Factor 1, involvement with ideas; Factor 2, identification with the college) which could be used to define 'subcultures' or more strictly, common orientations. The factors may be dichotomised into high/low extremes identifying four extreme groups:

- (i) Academic - high on both factors.
- (ii) Non-Conformist - high on Factor 1, low on Factor 2.
- (iii) Collegiate - high on Factor 2, low on Factor 1.
- (iv) Vocational - low on both factors.

Based on criticisms relating to the accuracy and generality of the classification system of Clark and Trow (1966), the typology was restructured (Docking, 1976). The revised typology is presented in Table 1.1.

Involvement with ideas was thus divided into two components, amount of intellectual activity (Volume) and diversity of intellectual activity (Breadth), while involvement with college was restricted to the more specific 'motivation to meet externally set goals and standards'.

Table 1.1

Revised Goal Orientation Typology

Amount of Intellectual Activity (Volume)					
		High		Low	
Motivation to meet externally set goals and standards (Motivation)	Diversity of Ideas (Breadth)		Diversity of Ideas (Breadth)		
	High	Low	High	Low	
	High	Scholar	Academic	Dilettante	Swot
	Low	Intell- ectual	Vocational	Flitter	Misfit

In practice, individuals do not, of course, fall into such clearly defined groups [although cluster analysis did identify eight groups for the Student Goal Orientation scales (Docking, 1976)]. However, the procedure demonstrates the manner in which the three variables defining perceptual frame of reference enable the description of types which can be related to the observations and research of others.

Self-theory, as described by Epstein (1973), incorporates the idea of self-concept. Viewed as a set of postulates one has about oneself (postulates which may be tested and falsified), self-theory is more dynamic than self-concept. Educational self-theory refers to that set of postulates one holds about oneself in the educational setting. PRISM is fundamentally a set of thirty such postulates to which the respondent can agree or disagree. It reveals an educational self-theory orientation in three dimensions corresponding to the three factors making up the sub-scales.

In order to measure perceptual frame of reference or style of intellectual functioning in a phenomenological way, self-report techniques were required. A questionnaire was developed because of the possibility of distortion of results due to interviewer/interviewee interaction. The multiple choice, closed response format was chosen on the grounds of reliability, validity and reactivity. The four point Likert scale was selected as the appropriate scaling technique.

DESIGN AND FORMAT OF THE PROFILE

The Profile of Real/Ideal Scholastic Motivation (PRISM) is designed to provide an objective description of an individual's frame of reference relating to education, where this is defined by characteristic orientation patterns and intellectual styles as measured through the individual's responses to a series of statements about education.

The PRISM was developed as a means of getting information about characteristic individual reactions to education in a rapid, objective and standard manner. It is brief and non-threatening, and is applicable to upper secondary through tertiary age levels. It is verbally undemanding, and is designed to be applicable to students, teachers, parents, and others.

While it is hoped that it will eventually become a profile of use to teachers and clinicians as well as to researchers, it is at present basically a tool for educational and psychological research. Besides being effective as a measure of the individual's frame of reference relating to education, it is particularly useful in interactional research and has special value when used in conjunction with other measures and techniques (Chapter 4). It facilitates research operations where time is important. The PRISM, therefore, has wide utility as a research instrument.

The format of the profile is suitable for both group or individual administration. It is easily administered to large groups at a time. PRISM is essentially a self-administering instrument. The impersonality of this type of administration results in greater frankness and objectivity on the part of respondents, and thus less distortion of responses is likely.

The PRISM is easily and objectively scored. A standard summative Likert scale format with machine scoring is used.

As noted earlier in this chapter, the forerunner of the PRISM was the Student Goal Orientation Questionnaire (SGO) first developed in 1976 as part of the instrumentation for a study of staff-student cognitive style similarity and student achievement at tertiary level. It was determined that these factors should be approached from the viewpoint of a personal perceptual frame of reference relating to education.

Student goal orientation was derived from three factors: amount of intellectual activity (VOL), diversity of intellectual activity (BRE), and acceptance of externally set goals or standards (MOT), i.e. volume and breadth of intellectual activity and external vs intrinsic motivation.

The scales derived to measure these variables were constructed with items from a wide range of sources, including the work of Katz and Katz (1968), Katz, Magin and Arbib (1969) and from studies reported by Feldman and Newcomb (1969). Likert scales of ten items each were formed after pilot testing with a sample of 160 students from a College of Advanced Education. The items are statements of attitude to which students responded on a four point scale.

Extensive validation was subsequently conducted on the scales, and they were found to be performing at a most satisfactory level (see Chapter 3). Each item has a moderate correlation with its factor (if too high, the item would be redundant) and has a very low correlation with other factors. Such a scale is factor pure (Cattell and Warburton, 1967), providing the greatest scope for maximum validity.

In 1977, the transferability of the scales was confirmed. Institute of Technology Health Science students were given the SGO in October, 1977. While the subscales were not as orthogonal as in the original administration, the results were highly satisfactory.

In 1978, items were carefully revised to allow for a wider range of application of the profile. (Potential target populations include students, teachers, parents and employers.) The SGO was renamed PRISM (Profile of Real/Ideal Scholastic Motivation). Validity comparisons of the old and the revised scales were carried out to ensure that the changes had no impact on the sound statistical properties of the original instrument. Further studies with Year 10 secondary school students and nursing students demonstrated the maintenance of these properties and the further transferability of the profile. (Refer to Chapter 3 for details of the further analysis of statistical properties of the profile.)

The profile consists of a series of statements about education. Each has four possible responses: SA (Strongly Agree), A (Agree), D (Disagree), and SD (Strongly Disagree). It consists of thirty items which form three scales (VOL, BRE, and MOT) of ten items each. Positive and negative items are balanced.

All answers are marked directly on the inside pages of the four-page profile booklet. The front cover is used for examinee identification and for the instructions.

THE QUESTION OF REACTIVITY

We cannot be sure that the instrument used in research has itself no effect on a respondent's willingness to respond, on the function being measured, or on other functions. In fact, it must be assumed to be inevitable that the instrument will have some degree of reactivity in these areas. This is of considerable importance and concern when measures aimed at deriving evidence of internal states are considered.

Thus, beyond the usual considerations of reliability, validity and efficiency, the construction of the profile gave careful attention to these dimensions also.

1. Effect of the Profile on the Respondent's Willingness to Respond:

The form and content of an instrument might be such that respondents become suspicious of its stated purpose, or they may become angry, defensive or embarrassed if it is complex, searching or suggestive. An attempt to reduce the effect of respondent bias within the scales involved careful explanation of the purposes of the test and assurances of anonymity. Passive (non-response to part or whole of the profile) reaction and active (written comments) reactions were examined in the 1976 administrations and it appeared that, overall, the profile provoked little unfavourable reaction.

Responses were obtained from 98% of the target population and in a mail administration, from 82% of the target population. Less than 1% of respondents commented or failed to respond to items.

2. Effect of the Profile on Function Measures (Turbidity):

Attempts to measure a quantity often change the quantity being measured. The wording of a set of questions on a questionnaire may influence the answer to later questions. In order to reduce this kind of reactivity positive and negative items were balanced to provide the best approximation to neutrality. Item intercorrelations confirmed that the positive and negative items carried equal weight.

3. Reactivity of the Profile and Other Variables (Disturbance):

It is possible that the Profile might heighten a respondent's awareness of goals and purposes in research, thus altering their performance and the outcomes of experiments. The breakdown of perceptual frame of reference into its constituent parts serves to minimise such an effect.

QUALITIES OF PRISM AS A MEASURE AND AS A RESEARCH TOOL

The PRISM has a number of advantages. Among these are the following:

1. It is non-threatening and verbally undemanding.
2. It is easy to administer.
3. There is no necessity for extensive specialised preparation for its administration.
4. It is quickly completed in 15-20 minutes.
5. Scoring is completely objective and quickly accomplished.
6. There is no time limit for completion.
7. No oral response is required, and no face-to-face situation need be involved, thus greater frankness and objectivity is encouraged.
8. It may be used as a group or individual instrument, and is essentially self-administering.
9. There is little or no reactivity.

All of the above point to a convenient, practical and economical instrument for a variety of research purposes in psychology and education.

2. USING THE PROFILE: ADMINISTRATION, SCORING

ADMINISTRATION

The PRISM is suitable for group or individual administration, and can be self-administered. The profile scales were designed to be as verbally undemanding and non-threatening as possible. Administration is simple and straightforward. No special preparation or training other than complete familiarity with the profile is required.

In administering the scales, the following general points should be considered:

1. Prior to administration environmental conditions should be checked to ensure a comfortable situation for responding. Arrangements should be made in advance in such a way as to minimise respondent contact and distractions, and, where appropriate, to facilitate movement of respondents who complete the profile very rapidly. (Optimally, this should be avoided, and all respondents should be encouraged to wait quietly until all profiles are completed. This is especially so when the PRISM is used in conjunction with some other measure such as an anxiety scale.)
2. For the purpose of establishing good rapport and maximising the validity of responses, an appropriate introduction should be given by the researcher/examiner. Instructions are printed on the front page of the PRISM booklet. In most cases it should be sufficient to go through the instructions and to emphasise the important points. However, where test-sophistication of respondents is limited it may be necessary to go over all the instructions carefully more than once.
3. The printed instructions should be reinforced by urging each respondent to give his own reactions as honestly as possible. The teacher/examiner should emphasise the confidentiality of individual profiles and the anonymity of respondents assisting the research projects. While these would be considered to be minimal, any contextual variables which may need to be considered

in interpreting the results should be noted while respondents are completing the profile. If the profile is administered by an assistant, as may frequently be the case in research practice, the researcher should see that the assistant is familiar with the instrument and is adequately informed to identify and report any possible confounding influences, such as respondent copying, so that the results may be properly interpreted.

4. For convenience all responses are recorded directly onto the PRISM booklet. The profile is untimed, but typically requires only about ten to fifteen minutes to complete. It should be administered in one uninterrupted session. Anyone taking an unusually long time should be reminded that the 'first reaction' is what is required for each statement.
5. When the profiles are handed in they should be checked to see that all respondents have reacted to each statement.

SCORING

Response Mode: As indicated earlier, respondents choose one of four alternatives for each item statement: SA (Strongly Agree), A (Agree), D (Disagree), SD (Strongly Disagree). This response is indicated by circling the appropriate alternative.

Scoring: Each response alternative is associated with a point value and the individual's score is determined by summing the point values for each statement.

A point value of 4 is assigned to SA, 3 to A, 2 to D, and 1 to SD, for positive statements. For negative statements the point values are reversed: SA = 1, A = 2, D = 3, and SD = 4.

Scores are computed separately for each scale (Amount of intellectual activity, VOL; Diversity of intellectual activity, BRE; and Acceptance of externally set goals and standards, MOT). For the separate scales, the scale score is the sum of the item scores for the 10 items consisting each scale.

Higher scale scores indicate greater amount and diversity of intellectual activity and greater willingness to accept externally set goals and standards, reflecting an overall positive perceptual frame of reference relating to education.

Polarity of each item and the scales to which they belong are given in Appendix 1, along with the questionnaire itself.

3. TECHNICAL DESCRIPTION: PROPERTIES OF THE PRISM

The PRISM has been developed over a period of experimentation extending from the construction of the SGO scales in 1976 to several administrations of the revised form in 1978 and is still being investigated. Currently, studies are being planned to assess its utility in examining the relationships between achievement, anxiety, and cognitive congruence in teacher/student interaction, peer interaction, and parent/child interaction. It might be expected that, with further use and research certain revisions and refinements may be deemed necessary or advisable. Any systematic use of the scales must take such possible change into account.

In this chapter, the efficiency, reliability and validity of the profile will be examined. The question of reactivity was treated in Chapter 1.

The first step in considering the properties of the PRISM was to make an immediate comparison with the 1976 SGO (the original instrument). A list of administrations is presented in Appendix 2.

PRISM/SGO COMPARISONS

The PRISM and the SGO were administered to a validation sample of 24 first year University School of Education students in 1978.

1. ITEM/ITEM CORRELATIONS

Since PRISM items represent a modification of the SGO items, correlations were carried out to ensure that the alterations had not changed the properties of the items in any significant way. Correlations varied from non-significant for 8 items to significant beyond the 0.05 level for 21 items. (There is one new item in PRISM.) This information suggests that any change in the scales may be minimal; there is a reasonable degree of association between the two sets of items. Further evidence will be provided by the scale/scale correlations to be discussed in the next section.

2. SCALE/SCALE CORRELATIONS

Table 3.1
PRISM/SGO Scale/Scale Correlations

Scale	$r_{\text{SGO/PRISM}}$	$r_{\text{SGO/SGO}^*}$	Difference Between** $r_{\text{SGO/PRISM}}$, and min. and max. $r_{\text{SGO/SGO}}$ (76)	
VOL	.76	.63 - .71	ns	ns
BRE	.67	.69 - .83	ns	ns
MOT	.75	.71 - .84	ns	ns

* derived from 1976 reliability data - least and greatest coefficients obtained

** Fisher's Z-transformations

Table 3.1 shows the relationship between SGO and PRISM scales administered in 1978 as compared with the relationship of SGO scales to one another (reliabilities) over different administrations or groups. The differences are statistically non-significant. Clearly the degree of association between SGO and PRISM is not significantly different from SGO/SGO correlations. Thus, there seem to be no important overall differences between the two editions of the scales (SGO and PRISM). Therefore, the findings based on the earlier form can be considered equally appropriate with the updated version.

EFFICIENCY

Efficiency of an instrument refers to the extent to which full use is made of all possible responses, and all items contribute to the scales and the results of the measurement.

Optimal efficiency is found when the items and the scales are sensitive, and when all items discriminate.

1. SENSITIVITY

Sensitivity is simply the measure of the use made of the scale. Summative scales, like those in the PRISM, can only be fully sensitive when no one item is insensitive. The maximum sensitivity of the scale can be seen to be the sum of the sensitivities of each item:

$$\text{i.e. maximum score range possible} = 3a + 2b + c$$

where, for N items, a items use the whole scale (4 choices), b items use three quarters of the scale (3 choices), c items use half the scale (2 choices), and the remaining items use only a quarter of the scale (1 choice).

(a) Item Sensitivity: Table 3.2 reports for each scale the average numbers of items falling into each of the categories described above (for all administrations). This indicates that the great majority of items are highly sensitive.

Table 3.2

Model Item Sensitivity for Each Scale

Scale	Administration	Use Made of				Maximum Possible Scale Range
		$\frac{4}{4}$	$\frac{3}{4}$	$\frac{2}{4}$	$\frac{1}{4}$	
VOL	School	10	0	0	0	30
	Tertiary	6	3	1	0	25
BRE	School	10	0	0	0	30
	Tertiary	6	4	0	0	25
MOT	School	10	0	0	0	30
	Tertiary	6	4	0	0	26

The high item sensitivity permits a large range of scores for the scales, as indicated in Table 3.3.

(b) Scale Sensitivity: Table 3.3 shows the average ranges of scores observed for all student samples compared to the possible range. Sensitivity is then calculated as a percentage of the possible range (last column). From this information it can be seen that the PRISM scales have a reasonably high degree of sensitivity.

Table 3.3

Scale Sensitivity - Possible and Actual Range

Scale		Possible Range	Highest Score	Lowest Score	Actual Range	Sensitivity as percentage of possible range
VOL	Ranges of all administrations of SGO and PRISM	21 - 30	32 - 37	16 - 25	10 - 18	47% - 60%
BRE	Ranges of all administrations of SGO and PRISM	18 - 30	35 - 38	16 - 26	10 - 20	40% - 69%
MOT	Ranges of all administrations of SGO and PRISM	22 - 30	27 - 37	11 - 18	15 - 26	53% - 87%

2. DISCRIMINATION

Items which make no contribution or a negative contribution to a scale are clearly inefficient. In fact, nondiscriminatory items are not only inefficient, but invalid.

In a small scale where each item is a major contributor to the total, item correlations will be artificially inflated. For a 10 item scale a correlation of 0.31 ($1/\sqrt{N}$) can be expected simply because the item contributes to the total. In order to overcome this problem, item/item scale correlations must be calculated using the total of all other items in the scale as the scale criterion.

Table 3.4

Cumulative Distribution of Item-Scale Correlations

Scale	Administration	>.6	<.6	<.5	<.4	<.3	<.2
VOL	School	10	10	8	5	2	0
	Tertiary	10	9	5	3	2	1
BRE	School	10	9	7	3	1	1
	Tertiary	10	7	5	3	2	1
MOT	School	10	10	7	4	2	0
	Tertiary	10	6	3	2	2	0

No items showed significant negative correlations with their partial scale totals. However, there is some degree of inefficiency in the instrument, in that 1-2 items on each scale do show correlations not significantly different from zero.

A caution is necessary in interpreting these results: efficiency requires not only that each item provides some contribution, but also that it provides a unique contribution rather than simply repeating the function of another item. High discrimination indices, therefore, would be unacceptable, implying that all items performed identical tasks. Such items would hardly produce efficient scales. Thus, a moderate correlation, but not too large, is a desirable result. Few items fail to meet this criterion.

The BRE scale of PRISM appears to be somewhat less efficient than the original in terms of this criterion. Otherwise, the PRISM scales appear to be no less efficient than the original scales and few items fail the criteria of moderate correlation and minimal expected contribution.

RELIABILITY

An important statistical property of any instrument is its reliability. By this is meant the extent to which the instrument gives consistent results. Ideally, to satisfy all conditions of reliability, the PRISM must be able to operate consistently when administered in different situations, with different administrators, at different times, to different samples of respondents. Each aspect of reliability reflects something of the precision with which the profile was constructed and something of the nature of the construct being measured.

The reliability of the PRISM has been studied using the test-retest model, rather than the split-halves or parallel forms approaches, since these actually confound reliability and validity and render correlation indices derived from them virtually useless, except as an estimate of the lower limits of validity.

A reliability estimate based on the test-retest model does not suffer the limitations of validity considerations, since the same test is used on two occasions. The only limitations to be considered with this approach relate to practice and other related effects. In the case of both the SGO and the PRISM instrument length is sufficient to militate against recall of previous responses and the pattern of answering is definitely obscure. A period of one week between administrations was allowed in the original reliability studies; long enough to lapse specific recall, but short enough to limit changes in the factors being measured.

Five different forms of reliability, each measured from test-retest experiments and each revealing different information can be defined - dependability, administrative reliability, pre-sophistication, transferability, and conspect reliability. These different ways of estimating reliability complement one another and provide a more complete understanding of the consistency of the scores. Conspect reliability or 'the degree to which two different psychologist scorers will obtain the same result for a given subject's set of responses' (Cattell and Warburton, 1967, p.46) is not an area for concern as the scale items are multiple choice and the profile can be machine marked.

1. DEPENDABILITY

This type of estimate of reliability, 'circumstance reliability', involves an assessment of how much the scores may alter on repeating the test with the same administrators, scorers, and controllable circumstances (Cattell and Warburton, 1967, p.45), i.e. how dependable is the instrument?

Dependability was determined from a small sample of twelve randomly selected first year University Physics students. The coefficients for VOLUME, BREADTH and MOTIVATION were .71, .83 and .84 respectively ($p < .01$).

On the whole this result seems to be satisfactory although one could hope for a higher coefficient on the VOL scale. In view of the small sample, however, these indices should be treated with caution.

2. ADMINISTRATIVE RELIABILITY

Since the PRISM (SGO) scales were developed to be self administering, a high degree of administrative reliability is desirable, i.e. the average administrator must be able to maintain the instructions and conditions as well as another.

Coefficients derived from two administrations of the SGO scales with a systematic sample of 23 first year University Physics students who completed the scales first as a captive audience and again at home in their own time one week later, provide the nearest measure of this form of reliability. Since these figures include situational variation they must be considered to represent the lowest limits to such reliability.

The administrative reliability correlation coefficients for VOLUME, BREADTH and MOTIVATION are .69, .81 and .80 respectively ($p < .01$).

Fisher's Z-transformations were employed to analyse the relationship between the indices of administrative reliability and the coefficients of dependability on each of the scales. This analysis showed that there were no significant differences between the two sets of indices, indicating that the scales can indeed be self-administered with almost as great a reliability as under strict control.

The data from the first administration (captive audience) and a second administration (by mail, four months later) to the whole of the original sample can also be used as evidence of administrative reliability. Table 3.8 shows that for all scales except BRE (and then only for the first year group), administrative reliability is satisfactory.

Table 3.5

First-Second Administration Correlations

Scale	First Year N = 149	Second Year N = 95	Third Year N = 43
VOL	.63	.63	.66
BRE	.48	.69	.83
MOT	.71	.74	.68

(The correlation on BRE for the first year group is significantly different at $p < 0.001$)

3. PRESOPHISTICATION

This coefficient is dependent upon the test experience of the respondents: do they have specific skills in answering this type of instrument? Should the respondent have no familiarity with the format of the measure, reliability might be influenced by a quite different performance in the second attempt. This effect can be expected to be minimal where student and staff groups such as those sampled to date are concerned. However, sample-sensitivity might be expected to intrude when certain parent and other groups are approached. This possible limitation to reliability will need to be kept in mind in further research using PRISM.

4. TRANSFERABILITY

Cattell and Warburton (1967, p.49) define transferability on two levels. A lower order meaning for transferability refers to the tendency of an instrument to measure the same thing with changing populations and occasions. The higher order aspect of the definition refers to the

constancy of such measures as validity and reliability across different groups, samples, or occasions.

The transferability of instrument function has already been demonstrated at least in part, by the estimation of administrative reliability (Table 3.5). Again, these figures represent lower limits to transferability as they are confounded by administrator and situational variation.

The test-retest data for first and second administrations of the SGO also provides evidence of transferability across occasions.

In general, the inter-scale correlations for the various administrations to date are near zero. While some were significant, no set pattern was observed and the common variance accounted for was always less than ten per cent.

Higher order transferability across groups is demonstrated by variation of Cronbach's α (alpha) across the various administrations to date. Cronbach's α coefficients ranged from .45 - .59 (VOL), .41 - .69 (BRE) and .61 - .79 (MOT). A reasonable degree of similarity was observed across administrations indicating adequate transferability across groups.

Overall, the PRISM scales appear to share a considerable degree of reliability.

VALIDITY

In educational and psychological research and measurement, the reliability of a measure is often overemphasised and overvalued at the expense of validity - the extent to which the instrument really does measure what it is supposed to measure. In fact, as long as the measure actually performs the function for which it was designed, i.e. is effective, some unreliability and some inefficiency and reactivity is acceptable.

Thus, validity is one of the most fundamental properties of an instrument. It is also one of the most intangible and complex. A direct measure of this property is impossible, but bits of evidence, taken together, may strongly suggest validity.

A number of definitions and meanings of validity exist, but generally, the following three types are the most widely accepted: criterion, content and construct validity.

Since criterion validity can only be estimated where there already exists a reorganised valid test of a criterion against which PRISM can consistently be compared, and since there are no existing measures, valid or invalid, of the factors measured by PRISM, no evidence of this type of validity can be provided.

The validity of the PRISM is approached in two ways: content validity and construct validity.

1. CONTENT VALIDITY

This type of validity can itself be further defined:

(a) by appearance: the instrument should appear to measure what it purports to measure - from the point of view of both the layman and the expert. The content validity by appearance, of the PRISM would appear to be acceptable as suggested by the respondents' lack of reaction to the scales. Since there appear to be no important differences between the statistical properties of the two editions of the scales (SGO and PRISM), the findings based on the earlier form can be expected to be equally appropriate with the updated version.

(b) by assumption: even though appearance may not suggest validity, a panel of experts may judge the measure valid. Given the limitations inherent in such a procedure, such as the subjectivity of a panel of experts and the possibility that they may not really understand the function of the test, this form of 'validation' does often improve the chances that an instrument will measure what it is supposed to measure, i.e. be valid.

Throughout the process of development of the scales, experts were consulted and improvements were made where their reactions or suggestions indicated that they were necessary. While validity is not thus assured, steps have been taken to attempt to meet the requirements of validity in this manner.

(c) by definition: the criterion, what the test is trying to measure, is defined by the test. The test-retest reliability of the measure provides the best estimate of validity in this case.

Cronbach's alpha coefficient is used as an index of the lower bound of the validity of the scales. Alpha coefficients for all administrations of the scales to date ranged from 0.36 to 0.79. The figures indicate that the measure is a reasonably valid one. Although not high they are considered acceptable because very high figures would indicate inefficiency, or failure by each item to make a unique contribution to the scale total.

2. CONSTRUCT VALIDITY

Does the instrument really measure the construct it is intended to measure?

'Construct' is a loosely defined term described by Cronbach and Meehl as follows:

a construct is some postulated attribute of people, assumed to be reflected in test performance. In test validation the attribute about which we make statements in interpreting a test is a construct (1967, p.247).

Group differences, interfactor correlations, and item-factor correlations were studied in relation to certain predicted effects in order to demonstrate the construct validity of the SGO/PRISM scales.

(a) Group differences: The quality of the instrument was examined on a sample of first, second, and third year University Physics students together with the staff of the Physics Department. It was predicted that these groups would differ or lie in particular rank orders on the scales.

Table 3.6

Group Differences on VOL, BRE, MOT

Scale	Group	Mean	Standard Deviation	Rank	Predicted Rank
VOL	1st Year	28.0	2.8	4	4
	2nd Year	28.7	2.7	3	3
	3rd Year	29.3	2.5	2	2
	Staff	30.9	2.8	1	1
	(Staff-1st Year difference significant at $p < 0.005$)				
BRE	1st Year	20.4	3.1	4	3
	2nd Year	27.1	3.4	2	2
	3rd Year	27.3	3.4	1	1
	Staff	26.1	3.5	3	4
	(3rd Year-Staff difference not significant)				
MOT	1st Year	21.3	3.8	4	4
	2nd Year	21.7	3.5	3	3
	3rd Year	22.3	3.0	2	2
	Staff	24.1	4.2	1	1
	(1st Year-Staff difference significant at $p < 0.01$)				

The figures in Table 3.6 show that the predicted order of ranks was generally confirmed lending support to the validity of the scales.

Docking (1973) provided further support of the validity of the scales by demonstrating predicted changes in student similarities to staff as they progress through their course (as tested by similarity figures calculated from the SGO and related to 'source of influence' measures) (see Chapter 4).

(b) Inter-Scale correlations: Several hypotheses about inter-scale correlations were formulated and tested. The results are summarised in Table 3.7.

Table 3.7

Predicted and Actual Inter-Scale Correlations

Scales	Predicted Correlations	Actual Correlations						
		SGO (76)	SGO (77)	SGO (78)	PRISM (78)	PRISM (Sch)	PRISM (Nurse)	PRISM (Can)
VOL/BRE	+ve preferably almost zero	.100	.22	.39		.33	.27	.16
VOL/MOT	zero	.076	.27	-.30		.30	-.13	.24
BRE/MOT	-ve	-.255	-.24	-.14		.17	-.28	-.02
N		287	50	24		121	38	170

Changes in emphasis are evident, and departures from the predicted direction of relationships do occur. However, on the whole, the figures support the claim of validity for each scale.

(c) Item-Scale correlations: Correlations between the items and their own scales have already been discussed under reliability. Correlations of items with other scales were also examined and confirmed the impression of scale validity. In most cases the items clearly supported the general definition of the scales, or bore a logical relationship.

VALIDITY SUMMARY

On each aspect of validity and with each scale, the evidence converges to lend support to a claim that the scales are valid, i.e. that they measure what they are intended to measure.

Chapter 4 adds additional information on the validity of the PRISM by showing its experimental relationship to other important variables, e.g. academic performance (achievement) and anxiety.

It is anticipated that, as with most educational and psychological measures, evidence on the validity and reliability of the PRISM will accumulate. To insure complete coverage in future printings of this manual researchers are urged to read the notice at the end of Chapter 4. 27

4. INTERPRETING THE PRISM IN RELATION TO RESEARCH FINDINGS: RELATIONSHIPS ESTABLISHED FOR PRISM IN EMPIRICAL RESEARCH

Research conducted to date has been valuable in establishing a number of relationships for PRISM and in developing a model for interactional research using the profile. In the following section the research model will be outlined and PRISM research to date will be briefly presented.

A MODEL FOR PRISM RESEARCH

As has been outlined in previous chapters, the PRISM provides a measure of an individual's perceptual frame of reference relating to education. It is possible to have varying degrees of agreement between individuals on any or all of the scales. If there is a high degree of agreement between individuals e.g. student and teacher, then a common cognitive structure can be assumed to exist. In this case, one can speak of cognitive congruity between the individuals in question. If, on the other hand, the PRISM scale measures vary considerably between the two individuals, there is no common cognitive structure and it is concluded that cognitive incongruity exists.

Individual responses to the PRISM can be used to obtain a measure of person-person or group-person incongruity (such as teacher-student incongruity or teacher-class incongruity). Incongruity is determined from the responses to the scales, using Cattell's r_p coefficient of similarity (Cattell, 1966). Over a set of teachers, for example, these r_p indices can then be reduced to ranks of similarity for each student.

The results can then be analysed using Page's L - test. This is a powerful non-parametric test of ordered hypotheses (related to the Friedman X^2), developed by Page in 1963. Given hypothesised ranks (such as may be drawn from congruity measures as described above), a comparison may be made with actual ranks on other measures (e.g. achievement) for each individual, and partial Ls can be derived:

$$L_i = \sum_{j=1}^n X_{ij} Y_{ij} \quad \text{where } X_{ij} \text{ are actual ranks (e.g. achievement with each teacher)}$$

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$$Y_{ij} \text{ are hypothesised ranks (e.g. of congruity with each teacher)}$$

The total value of L can then be determined by adding the partial Ls

$$L = \sum_{i=1}^m \left(\sum_{j=1}^n X_{ij} Y_{ij} \right)$$

This procedure allows the researcher to test whether there is any significant relationship between the degree of cognitive congruence shared by two individuals and other measures such as achievement and anxiety. The PRISM scales have already been found to be valuable indicators of incongruence related to achievement, and to anxiety, and have also been employed to provide a potential explanation for the achievement-anxiety relationship.

The procedure described above has been applied by Docking in studies of staff-student cognitive incongruence as related to achievement and to anxiety. A model of communications provides the theoretical framework for these studies. The model involves modifications (based on Runkel's (1956) paradigm) to the Rogers/Hogan (Rogers, 1951, p. 516) paradigm so that additional pathways are incorporated. Figure 4.1 shows the modified paradigm in its complete form (Docking, 1978).

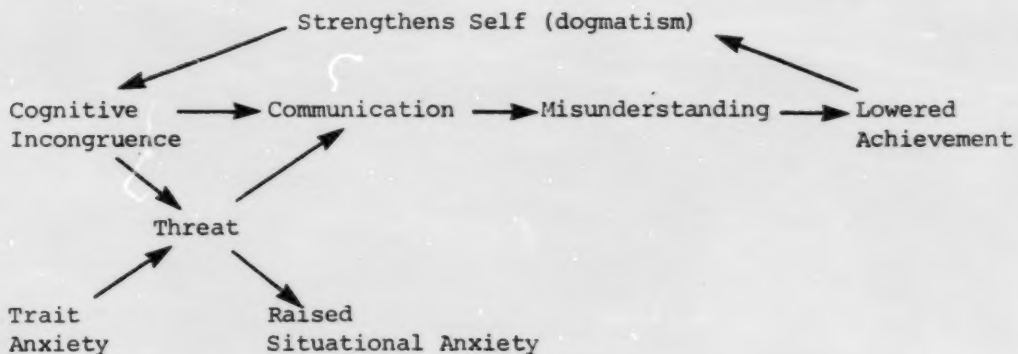


Figure 4.1 : Modified Rogers/Hogan Paradigm

The experimental requirements for such studies using the above procedure and based on the Rogers/Hogan paradigm and Page's L - test are:

- . minimum cyclic interaction
- . minimum environmental variation
- . control of background variables

- . sufficient N in each group (at least 20)
- . each student must experience the same combination of treatments
- . each treatment must be the entire responsibility of one teacher

The following sections of this chapter report several studies by Docking and identify the principal connections with cognitive congruence that have been examined in each of them. The chapter concludes with a consideration of other possible applications of the PRISM.

1. Incongruence and Achievement (Docking and Thornton, 1979).

287 University Physics students (98% of Physics students) and 30 staff members were administered the SGO (PRISM) in June, 1972. The scales were re-administered to the students (by mail) just before the final exams in October of the same year, and 82% of the first sample responded.

In order to check a major assumption in the research design, that perceptual frame of reference is relatively unchanged over a semester of study, Cattell's r_p index of similarity was used to ascertain whether any significant shifts had occurred between the two administrations. No significant changes were found; this was especially so for third year students. The main hypothesis tested was that there is a significant positive relationship between student/lecturer congruence and student achievement assessed by that lecturer. Page's L values were derived for two second and two third year groups. In general, the hypothesis was supported. The L values and significance levels are presented in Table 4.1. The results of the Physics 303 group can be explained by the fact that unit combinations were not all the same for these students (three compulsory plus four selected out of ten), while in all other groups, all units being compulsory, all students experienced the same treatment combinations.

Table 4.1

Page's L Values for Achievement and Incongruity

Group	SGO		
Physics 201	M = 33 n = 7	L = 3857	p = 0.007
Physics 203	M = 47 n = 5	L = 2196	p = 0.009
Physics 301	M = 20 n = 13	L = 13168	p = 0.03
Physics 303	M = 20 n = 7	L = 2212	ns

Where M = number of students

n = number of ranks (subjects)

Physics 101 was not tested for congruence because of the lack of one-to-one correspondence between lecturer and examiner.

2. Incongruence, Anxiety and Achievement (Docking and Thornton, 1979).

50 Institute of Technology Health Science students were administered the SGO and AAC scales¹ in October, 1977 (98% of the population of full-time first year students). The six lecturers teaching the course were administered the SGO scales.

(a) Incongruence and Anxiety: It was hypothesized that there would be a significant negative relationship between student/lecturer congruence and student anxiety. Both standardised and raw anxiety scores were utilised in this experiment.

(Standardized scores were employed as variations in overall anxiety level may have been temporal rather than characteristic of each course.) Responses relating to three of the six courses

¹ Modified Zuckerman Affect Adjective Checklist (Zuckerman, 1960; Docking, 1978).

were studied (wide variation between the other three militated against the possibility of testing the hypothesis). Page's L value for both standardised and raw anxiety scores was significant at $p = 0.004$ and $p = 0.03$ respectively. Thus the hypothesis was supported i.e. situational anxiety associated with taking subjects with particular lecturers (as measured by the modified AAC) is directly related to the degree of staff-student incongruence (as determined from the SGO scales).

(b) Incongruence and Achievement: Academic results were obtained for 5 of the 6 courses taken by the above sample. The sample was reduced to $N = 38$ (75%) by incomplete results and failure to supply names. Incongruence and achievement ranks were determined and Page's L values were calculated. The results ($p = 0.03$ over all courses; ns over the 3 similar courses) indicate a detectable incongruence/achievement interaction, replicating the results of Docking (1976).

Taken together, these results provide strong support for a direct link between cognitive incongruence and achievement and cognitive incongruence and anxiety. This has implications both for educational practice and for further research. The findings on anxiety are significant to other diadic communication situations, lending practical support to the Rogers/Hogan paradigm. Docking (1976) concludes that staff-student cognitive congruity plays a vital role in learning.

3. Earlier Research involving the SGO scales was reported by Docking in 1972 and 1973:

(a) Prediction Model of Student Achievement (Docking, 1972): 160 students in the first year of Diploma of Teaching (Primary) course were administered the SGO (50% of total group). The predictive value (for first year performance) of a number of variables was examined. Prediction was found to be improved by information additional to earlier performance data. The improvement

was great if information from the SGO was included. The strongest effects involved clarity and acceptance of personal and institutional objectives.

(b) Perceived Influences on Tertiary Students' Academic Attitudes: A comparison of perceived sources of influence on academic attitudes was made between four groups of students (Primary Teachers College first years and 3 year groups of Physics students).

Specific differences between groups were hypothesised on the basis of observable environmental differences. These hypotheses were supported. In particular, lecturer influence was studied and found to be of least importance to first year Physics students. Lecturers became more important influences over the years. SGO responses by both staff and students indicated that students become more like their lecturers in perceptual frame of reference relating to education.

FURTHER RESEARCH

A number of distinct lines of research can be suggested for further study. The PRISM scales could be used to study:

- . modelling effects in professional schools or faculties
- . interaction effects in less structured learning environments
- . the correlation of observable teaching/learning behaviours with PRISM profiles
- . various aspects of teaching styles, learning styles, and assessment techniques.

Replications of the observed relationships in different learning environments and with different types of students are also called for.

The Page's L test as an analysis technique fails to allow for exploration of the relative significance of the various factors. Future research should utilise more traditional forms of analysis (such as ANOVA) which will require a change in research design.

A study is currently underway to investigate the relationship between felt anxiety and achievement and other factors in school children. Teacher-student and peer interaction will be examined and in addition the relationship between cognitive congruity and vocational choice will be investigated.

NOTICE TO USERS OF PRISM

The author of the Profile of Real-Ideal Scholastic Motivation (PRISM) is interested in encouraging research utilising PRISM.

Researchers investigating the reliability, validity, or utility of PRISM are urged to provide brief outlines of projected or ongoing work and reprints or copies of their reports of both published and unpublished studies to the author of PRISM so that data can be included in subsequent printings of this manual.

Material should be addressed to:

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APPENDIX 1

THE PRISM INSTRUMENT

Scale Membership

Volume	+	4	10	16	22	28
	-	1	7	13	19	25
Breadth	+	2	8	14	20	26
	-	5	11	17	23	29
Volume	+	3	9	15	21	27
	-	6	12	18	24	30

The complete questionnaire is reproduced on the following pages.

It should only take you fifteen minutes or so to finish. When complete, please check that you have answered every question, then return the booklet as requested.

Please complete the details requested below.

Name : _____

surname	initials
---------	----------

School or institution: _____ Year _____

<u>Subject</u>	<u>Level</u>	<u>Instructor</u>
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This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

Other details (as requested):

(a) _____ (b) _____ (c) _____

CONFIDENTIAL

- | | | | | | |
|-----|---|----|---|---|----|
| 1. | More importance should be placed on sports and social activities here. | SD | D | A | SA |
| 2. | An education should develop a lively intellectual interest in a wide range of topics. | SD | D | A | SA |
| 3. | Students should be tested as often as possible. | SD | D | A | SA |
| 4. | Teachers should be selected because of their ability to get students to think deeply in their subject. | SD | D | A | SA |
| 5. | Education should provide a deep understanding of one field of knowledge. | SD | D | A | SA |
| 6. | Examiners should keep in mind the needs of each student in setting and marking examination papers. | SD | D | A | SA |
| 7. | Educational institutions should insist that <u>all</u> students engage in some non-academic activities. | SD | D | A | SA |
| 8. | Education should serve to widen one's intellectual experience. | SD | D | A | SA |
| 9. | Examinations are consistent with the ideals of education. | SD | D | A | SA |
| 10. | Education should encourage students to think in depth. | SD | D | A | SA |

- | | | | | | |
|-----|---|----|---|---|----|
| 11. | Education should train students to become expert in a narrow field. | SD | D | A | SA |
| 12. | The failing or passing of an examination is not as important as the learning that goes on before it. | SD | D | A | SA |
| 13. | Teachers should clearly state the minimal requirements for a pass. | SD | D | A | SA |
| 14. | Education should aim to develop in the individual a personal view of life. | SD | D | A | SA |
| 15. | An examination is necessary so that one can prove to others that one is qualified. | SD | D | A | SA |
| 16. | The working year is too short here. | SD | D | A | SA |
| 17. | It is not the purpose of an education to encourage freedom of thought. | SD | D | A | SA |
| 18. | You should set your own goals and standards - no one else can do it for you. | SD | D | A | SA |
| 19. | This institution should employ teachers who can get the maximum number of people up to examination standard with the minimum of student effort. | SD | D | A | SA |
| 20. | Education should help one develop an understanding of world issues. | SD | D | A | SA |

- | | | | | | |
|-----|---|----|---|---|----|
| 21. | Examinations are necessary if standards are to be kept up. | SD | D | A | SA |
| 22. | Educational institutions should provide facilities for students to engage in a lot of study. | SD | D | A | SA |
| 23. | Educational institutions should provide an environment where a student's specialised interest is developed. | SD | D | A | SA |
| 24. | Formal examinations should not be used here. | SD | D | A | SA |
| 25. | These are the best years of your life and should not be wasted on study. | SD | D | A | SA |
| 26. | Education should emphasise a broad involvement with ideas. | SD | D | A | SA |
| 27. | Examinations provide the opportunity for one to gain recognition for one's efforts. | SD | D | A | SA |
| 28. | An education should serve to develop the mind. | SD | D | A | SA |
| 29. | Teachers should specialize in teaching one field, and not try to teach a range of subjects. | SD | D | A | SA |
| 30. | Examinations distort the true purpose of education - learning for its own sake. | SD | D | A | SA |

APPENDIX 2

LIST OF ALL ADMINISTRATIONS OF SGO/PRISM

Administration	Sample	N
SGO (76)	Physics students University Years 1-3	287
SGO (77)	Medical Technology students Institute of Technology Year 1	50
SGO (78)	(Validation Sample) School of Education students University Year 1	24
PRISM (78)	(Validation Sample) School of Education students University Year 1	24
PRISM (Sch)	Secondary school students Non-Government College Year 10	121
PRISM (Nurse)	Nursing students	38
PRISM (Can)	Secondary school students State school, Year 10	170